

系统资源约束 理论 实践

●赵建华●郭琦 / 著

ZhaoJianhua Guoqi

The Exploration and Demonstration
of the System Resource Constraint Theory



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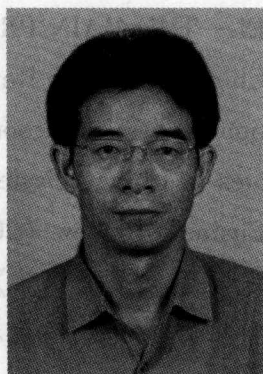
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作者简介

赵建华，男，1966年11月出生于云南大理市，白族，中国民主建国会成员，江西省鹰潭市第六届政协常委，鹰潭市统计学会副会长，江西省青联委员，江西优秀青年学者（2004），鹰潭市突出贡献专家，湖北省宜昌市政协委员，国家生产许可证注册审查员、国家质量体系审核员，国家注册计量检定员及计量测试高级工程师，中国地质大学资源产业经济学博士，三峡大学经济学副教授、硕士生导师。主要研究方向：系统资源约束理论，企业理论，工程质量管理，人口、资源与环境经济学。先后主持江西省社科基金“十五”规划项目《系统资源约束理论与城乡经济可持续发展》（05YJ70）、自筹项目《赣杭构造湖区恐龙群特征》、《因特斯英语突击法》等，参与国家质检总局《中国质量竞争力指数研究（江西）》（排名第二）研究。拥有“发现鹰潭恐龙化石遗址”、“因特斯英语突击法”、“系统资源约束理论”、“恐龙生殖衰退学说”等原始创新性成果。先后为江西铜业集团公司，三川水表，贵溪化肥，宏磊集团等众多中国名牌、驰名商标、国家免检产品生产企业提供了质量战略规划及管理咨询服务。提出“宜工则工宜农则农”等城乡协调发展理念、“企业发展资源环境双约束”理念。在国家生产许可证管理中探索出“亚菲达模式”、“塘湾谷酒监管模式”、“耐乐铜管监管模式”等。在鹰潭市政府质量科负责



人及市政协常委任上，作者以系统资源约束理论为指导，对城乡经济问题进行了有益的探索，为江西铜精深加工产业锁定在江西鹰潭作出了不懈的努力。

发表7篇论文，《计量与社会经济可持续发展》发表于《当代财经》(2004)，《最优质量水平——质量经济学的主要命题》发表于《科技进步与对策》(2005)。OPTIMUM QUALITY LEVEL—THE MAIN PREPOSITION OF QUALITY ECONOMICS 发表于 Chinese Business Review (May, 2005), The Theory and Demonstration of System Resource Constraint, Current unemployment of graduates in China, System Resource constraint Theory 等发表于 Chinese Business Review (2006, 2007)，《完善质量检验强化目标考核》发表于《质量探索》(2004，第二作者)，《赣杭构造湖区恐龙群特征》《研究赣杭构造湖区恐龙群的新契机》发表于《南方文物》。

郭琦，三峡大学经济与管理学院经济学教授，硕士生导师。2001年毕业于武汉大学管理科学与工程专业获管理学硕士学位。全国注册造价工程师，PMP项目管理师。中国发电工程学会工程造价专业委员会委员、湖北省建设工程造价管理协会咨询专家、湖北省招标投标专家库专家。郭琦教授主要从事工程管理的教学和研究工作，出版专著“工程造价管理的理论与方法”、教材“建筑工程计价”各一部，发表“论建设工程设计招标制的几个关键问题”、“施工企业机械设备租赁与购买的经济比较”、“水电工程投资控制理论与方法探讨”、“建设项目设计阶段的特点及其投资控制”、“工程招标中价格的形成机制及主要影响因素”、“The Economic Post - assessment of Distribution Network Construction Based upon Artificial Neural Network and Multi - index Overall”、“Comparison of General Contracting Enterprise and PM Enterprise”等学术论文 30 余篇，近年来主持完成了“溪洛渡工程定额测试与分析”（三峡开发总公司）、“水电造价工程师知识结构及教材研究”（三峡开发总公司、国电公司成都勘测设计院）等科研课题 10 余项，曾获中国建设工程造价管理协会优秀论文奖，湖北水利发电工程学会理论成果二等奖和学校科技进步一等奖。

ABSTRACT

Since 1978, china, now the fourth largest economy, has been developed rapidly at the average growth of 9.6%. Chinese resources are rich in total but poor per capita. After entering WTO, china combines itself into global system to supply low technology product for world market at low cost of human resource and high resources consumption. At the same time, serious differentiation occurs in china regional economies formed four classes of society (Hu Angang, 2001). The most areas of Middle China belong to the worst class. China Central Government promotes Middle - China - Development to realize mutual development between regions in china. There are mainly double constraints including resource constraint and market constraint obviously. Facing for market constraint because of saturation of domestic market and less share in the global market of top product, china begins to build an nationwide innovational system and develop self - own brands. Wanting of state investment, intelligent capital, innovation spirit and venture mechanism as well as competent brand group, the way for middle china to science development becomes the focus of theory and industry. This paper intends to set up The Theory of System Resource Constraint(SRC) to research growth of economy under different strength of system resource constraint. By analogy between ecology system and economic system, from the angle of total nature resource, total supply ability and total market volume, the theory focuses on the condition of constraint and development characteristic of economy as well as the various game characteristic among economies such as independence, competition, and joint competition. The author analyzes System Resource Constraint of Jiangxi as a case of demon-

stration. The result of research is a example of Middle China sustainable development.

The first part, based on 29 years' rapid growth of china, as well as its non - balance regional development, the author discuss the further development of Middle China under the constraint of resource and market resource, and summarize the research of present situation of resource and market constraint and the development stages of resource view, show the theoretical and practical value of building The Theory of System Resource Constraint. There are documents about resource constraint and market constraint, however, the later appears only in the finance analyze. It is a theory innovation to combine the double constraints. As the research method, the author combine Positive research with Normative research, Quantitative analysis with Qualitative analysis, Systems analysis with Analogy analysis, Historical analysis with Fact analysis.

The second part focuses on the constraint exerting on ecosystem from the food resource. The earth ecosystem is based on sustainable supply from solar energy. The later is limited, leading to the limited ability for ecosystem to absorb the solar energy. The earth ecology follows the way from monopole ecosystem to dipole ecosystem and further to multipolar complex ecosystem. Logistic bacteria experiment shows that the total of the nutrition on the base constraint the bacteria growth. Darwin's theory reveals the basic law of biological evolution. However, Darwin declares that overbreeding causes creature competition according to Malthus', which leads to further growth of creature total. Through the upgrade of ecostructure, nature make good use of limited natural resource to support creature to the utmost; Comparing the Logistic model used in biology with in economics, by analogy, the author declares that food constrains the growth of total creature; the system resource constrains the growth development of economy.

The third part, the author summarizes economic growth theory and resource constraint theory for a further description of system resource constraint

theory. Resource Constraint Theory associates with society economic development. China has developed science – development view from ancient human nature coexist view to man – conquer – nature view; from ancient Greece Xenophon to Aristotle's growth view to The view on resource of William . Petty and Smith' hypothesis, Pessimistic model of R. T. Malthus' and Optical model of David Ricardo; The opinion of William S · Jevons and The myth of Alfred Marshall' market mechanism, to the latest common view of sustainable development. Under globalization, developed country can't grow further without resource and market from the developing. Sustainable development is a global strategy of win – win. Serious people resource problem urged people to form a pessimistic view. In the other time, because of science and technology innovation, Economist developed optical views. Entering the neo – economics time, economic growth seems to get rid of resource constraint, but the author takes market constraint as main constraint fact. Above all, the resource constraint views alternate between constraint and non – constraint. The author then analyses various growth scholars for reason of System Resource constraint Theory.

The fourth part, according to System Resource Constraint Theory, all kinds of resources including traditional economical resources and non – traditional ones has potential and actual value. The system output relies on the support of system resources. The author declares that system resources match each other. According to the barrel theory, the Short Board Resources are scarcity while the Long Board Resources are rich comparing with the most resources; Science and technology progress could enhance the effective usage of the resources, change the matching relationship among the resources and discover new resource or substitution or new usage of the old resources, so as to change the matching of the resources and the situation of scarcity or richness; Adding the amount of any kind of system resource to to a producing, the output of the resource will increase because of scale economy and meet the ceiling at last for the law of diminishing returns; The market volume shows the matching relationship among the resources and is a kind of resource which derives

from individual purchasing ability. The limit of market demand is the market volume under the certain system and technology level as well as Pareto efficiency situation; the development of economy would meet double constraints, the first is from natural recourse, the second from market constraint. System resources integration, technology progress and organization structure upgrading are the ways to enlarge the output and market volume of system. Researching the economies with the similar resources groups, various technology and resource usage level, organization efficiency, learning ability etc. correspond different output curve. Facing for a mine, mini miner adopts the rich ore without making good use of the poor ore and protecting the environment, while the larger company takes more society responsibility by using lower grade ore, making comprehensive use of resources and protecting the environment. The later consider not only individual interest but also public interest. Under the constraint of system resource, the closed economy develops in the model of Logistic, before the Logistic Inflection Point, the output of the system grows because of the scale economy, and after Logistic Inflection Point, the market constraint lead to diminishing returns. By math deducing, the author shows that the models of Malthusian and Zero - growth are the special types of Logistic Model. The market is the attribute of the ability and will that a economy possesses the resource so as to exchange the other resources. According to the Gossen's Law, the ability and will to purchase is limited, the market demand is also the scarcity resource. The market volume is the aggregate demand. Market volume and the social wealth are in the direct proportion. Market volume and wealth concentration degree are in the inverse proportion as well as associating with division of labor and efficiency of productivity. The author forms a output model based on Malthus' and Ricardo' Model; theoretically, The system resources constraint situation can be described with the help of coordinates. The author sums up night kind of constraint situation.

The fifth part, the author introduce information of middle china, and analyze function of its development for china economic system based on System

Resource Constraint Theory. The Eastern China finds the market for the high-tech industry while upgrading the Middle China's industry. Middle China's advantage industries can attract the eastern investment, and supply the matching produce at low price. The economic base of Middle-China-Rise focuses on agriculture and resource. Middle-China is the most important national base of agricultural product. The energy resource is rich. Middle-China possesses industry system with advantage main industry and serial industries and forms the important produce base of heavy industry. The complete industry system includes coal, power, metallurgy, machinery, and chemical industry, and textile industry. Comparing the economy development abilities among the six Middle-China provinces, the author analyzes economical result, government efficiency, open-up degree, commercial and finance achievements, science and human resource, infrastructure and education etc. Most indexes except education are lower than national average level. Chinese four economies, including east china, Middle China, west china and northeast, show the trend to co-develop harmoniously. Middle China Rise needs national development strategy and regional interest adjustment system.

The sixth part, as a marginal province between Middle China and East China, Jiangxi, a case for study, has the special significance to develop which is enlightening for other under development area. Jiangxi Quality Competition research (1999 - 2004) shows that the index of recent years rise in general, but less competent than national level; The city quality in high industrialization is more competent; the quality of heavy industry is higher obviously than the light industry and the distribution among the industries are not balance; the six pillar industries reach or nearly reach the national level, but less competent because of less investment for innovation and quality improvement and being at low level of industry. As for county economical development, Jiangxi has some problems such as poor result of industry congregation, low finance income and poor basement of education and science as well as weak industry basement.

Analyzing city competition situation, Jiangxi is shared by the city of other economic zones. Jiujiang belongs to Big Wuhan economic zone, Ganzhou, Big Hongkong zone, Yingtan and Shangrao, Big Shanghai zone, Pingxiang, Chang - Zhu - Tan in Hunan. The reason is that Nanchang or other cities are not competent enough to form an independent growth polar. There are two steps for Jiangxi to develop. The first is to break up the whole into parts to form economic blocks according to the resource situation and present industry. The second is to form a center based on natural choice. In order to breakthrough the system resource constraint, author brings up following conception, supporting huge enterprise group to develop scale economy; opening up entirely to develop export - oriented economy, innovating to promote quality competence, speeding up urbanization to optimize economy structure and to replan the industry, widening channel for investment to support civil venturing, interacting between agriculture and industry to build neocountryside. At last, author takes Jiangxi Copper Corporation Group as a case to analyze codevelopment with local area.

The seventh part is for summary and prediction of the theory, the innovation of this paper are as follow, The First is the View of System Resource Constraint, deduce the traditional resource constraint view to System Resource Constraint including natural resource constraint and market resource constraint. The author describes the scarcity of market resource so as to analyze neo - economic constraint situation with the help of System Resource Constraint. The Theory of System Resource Constraint can be used to explain all various industries; The Second is the economic explanations for Logistic Inflection Point, which can mimic real economy system and help to unite the return increase and return diminish. According to the math deduce, author find that Logistic model is relation with Marthus's model and Zero - growth model; The third is Opportunity return analyses; Opportunity return means the economy carry out science and technology innovation, system innovation, organization reformation, industry adjustment and strive for excellent quality to earn

the possible returns . Successful innovation can enlarge the market share and loose resource constraint to push Logistic Inflection Point away and complicating the system situation. Taking Jiangxi province as a case for demonstration, the author perfect the development strategy as follow, Connecting ChangZhu-Min Deltas, Constructing city group of Wu (han) Chang (sha) Nan (chang) , entering globalized system, which adds the middle phrase to enlarge the resource basement. JXCC is a further demonstration analyze case, it is an example for successful development following the strategy: cherishing recycle economic view to excavate resource capacity, building a fictitious team to form a super organization; Innovating finance to break the system resource constraint; developing excellent brand to improving sustainability and realize co-development.

The defects of the dissertation are as follow. The theory of system resource constraint is an original innovation theory to explain the complicated characteristics of economies. The research should be carried out from various angles and levels. New conception and new explanation for some economical phenomenon under the new theory should be proved and demonstrated. However, in order to keep dissertation in logic and suitable scale, the author focuses demonstration on regional economy development. It is a pity that the dissertation doesn' t include the detail of quality economics and neoeconomic constraint analyses, which will be further researched systematically.

摘 要

实行改革开放政策以来,中国保持了29年的高增长,年平均GDP增长率达到9.67%。远高于同期世界经济3.3%左右的年均增长速度(马凯,2007)。目前已是世界第四大经济体。随着国民经济的快速发展,资源约束和市场约束问题、区域发展协调问题、效率与公平问题,中部地区快速发展及发展战略选择问题的理论探索与实证研究有重要的理论意义及现实意义。

本书在综述资源约束发展传统理论的基础上,把传统的资源约束扩展到以资源市场双约束为主的系统资源约束,建立系统资源约束理论以研究经济体在不同级别系统资源约束条件下的增长规律。该理论通过生态系统与经济系统的类比,考察经济体发展的约束条件及其发展特征,以及在约束条件下经济体之间独立、竞争、竞合等各种博弈行为特征,并以中部省份及其相关产(企)业所处的自然资源约束、市场资源约束为例进行分析,总结了该理论在实践中运用的相关案例。研究成果对中西部欠发达地区如何发挥优势参与国内国际竞争,实现可持续发展具有重要的理论意义与现实意义。

第一部分首先从中国近30年的经济持续快速增长及其造成的区域发展差异出发,讨论中国及其中部欠发达地区经济进一步发展所面临的环境资源问题、市场约束问题,系统总结了资源约束及市场约束的研究现状、资源观发展阶段,提出研究并建立系统资源约束理论重要的理论和现实意义。把资源约束与市场约束结合起来集成分析经济系统发展的系统资源约束特征,是本文的

主要理论创新。该论文选择实证研究与规范研究统一，定量分析与定性分析统一，系统方法与类比方法统一，历史与现实统一的研究方法。

第二部分重点讨论食物资源对生态系统的约束作用，为生态系统与经济系统的类比打下基础。地球生态系统建立在太阳能资源的持续供给上。而太阳能资源是恒定的，生态系统固定太阳能资源的能力也是有限的。地球自诞生以来，生物从无到有，由少到多。生态系统逐渐演化成复杂多极多层次生态系统。逻辑蒂克(Logistic)细菌实验揭示培养基上的营养量制约细菌群落生长的规律。研究发现：达尔文进化论理论核心基本揭示了生物进化的规律，但《物种起源》中提出的“生物过度繁殖引起生物竞争”观点值得商榷。“过度繁殖”的概念是直接来自马尔萨斯人口理论中借鉴而来(达尔文, 1859)。通过研究哺乳动物的繁殖能力与环境资源的关系，我们得出繁殖力与食物量等环境因素相关。食物资源约束导致生态结构升级；而生态结构升级又导致生物总量进一步增长。生物系统演化的方向是：充分利用有限的太阳能资源支持起尽量庞大的生命系统。通过类比得出，经济系统演化发展方向也是用有限的资源产出最大的社会福利。

第三部分首先对经济发展理论及资源约束理论进行综述，为进一步论述系统资源约束理论打下基础。资源约束理论的发展与社会经济发展水平息息相关。从中国古代“天人合一”思想到“人定胜天”思想再到科学发展观、从古希腊经济增长思想到西方现代经济增长理论研究表明，乐观发展观与悲观发展观多次反复交替到最后达到可持续发展共识。在经济全球化的今天，富国的进一步发展离不开欠发达国家的资源与市场。穷国的经济振兴得益于富国经济的可持续发展。人口资源问题导致悲观的资源观；科学技术革命及新资源的开发利用则促成乐观的资源观。进入新经济时代，经济增长并未摆脱“资源约束”，市场约束变成

约束新经济增长的主要因素。总之，资源观在“约束”“非约束”两类观点间游移不定，相互交替。各种经济增长学派的分析，为系统资源约束理论的研究理清了逻辑思路。

第四部分主要论述系统资源约束理论。该理论认为：一切系统资源（包括传统的经济资源、非传统资源）皆有现实或潜在的利用价值，系统产出要依赖系统资源支持。系统资源相互匹配，木桶理论中“短板资源”是稀缺的，而“长板资源”则是相对富余的，“长板资源”遭受市场约束；科技进步将提高资源利用效率，改变资源利用组合，也可发现新资源及替代资源或资源新用途，因而改变系统中资源的分配及稀缺或富余状态；观察资源组合相似的经济系统，不同的生产技术水平、资源利用程度、组织运行效率、学习知识能力等，对应不同产出量曲线。系统产出的持续增长受自然资源（包括环境资源）约束。在系统资源约束条件下，（相对）独立系统内经济体的发展在可用资源限制下呈“逻辑蒂克曲线”型增长。开放型经济系统中，经济体呈现“逻辑蒂克曲线”及其不同变化组合形态。经济体的发展在逻辑蒂克拐点之前因为规模经济等而可能使边际收益递增，拐点之后，因为市场约束而使边际收益递减。作者经过数学推导证明马尔萨斯指数增长模型及“零增长模型”是逻辑蒂克曲线的特殊形式。市场资源是分工基础上市场主体拥有资源量并用于交换其他资源的能力与愿望的表征。根据戈森定理，购买力与购买欲望有限，市场需求也是一种稀缺的资源。市场容量是经济系统市场需求总量。市场容量与社会财富总量及与人口总量呈正相关关系，与财富分配集中度呈反相关关系，与专业化分工程度及生产效率正相关。作者的产出模型本质上是大卫·李嘉图模型与马尔萨斯模型的叠加：理论上讲，我们承认资源约束的存在，同时我们认为资源约束是可以通过科技进步等实现突破。系统产出在科技进步推动下，不断突破约束又遭遇更高层次的约束。作者使用约束坐标

系统来表示系统资源约束状态，并总结了九种典型的约束状态。

第五部分介绍中部六省的基本情况。从系统资源约束理论的视角，分析中部地区在全国经济系统发展中的作用、意义。系统资源约束理论揭示：经济区域之间的财富集中度越高，全国的市场容量越小。具体地说，在中国经济发展从投资和出口拉动型向扩大内需型发展时，东部的高科技产品必须在改造中西部产业过程中找到市场，高档产品要在国内消费层次结构升级中找到市场。改革开放近30年来，东部沿海发达地区在倾斜政策中先富裕起来，由于先发优势，在全国市场逐渐扩大过程中占有大部分市场份额，也完成了资本的原始积累。中部市场资源没有相应提高，中部社会经济发展能力指数呈“零增长”模型。中部优势产业（如资源产业、资源深加工产业及绿色食品产业）能吸引东部资本（如温州财团游资），为东部产业提供低成本配套产品。在中部崛起的资源经济基础分析中，系统介绍了地理位置及交通条件、中部资源禀赋：矿产资源、农林资源、水资源及旅游资源等。中国东、中、西、东北四大经济区域初现协同发展趋势。中部崛起呼唤国家战略及区域利益协调机制。最后，我们应用系统资源约束理论对中部资源经济基础及复杂经济现象进行理论分析，得到很好的印证。

第六部分讨论江西经济发展战略。江西作为中部与东部沿海发达地区的边缘省份，其发展战略研究有现实意义。作者以江西发展战略进行实证研究。首先通过江西省质量竞争力现状分析课题研究揭示：一是近年来江西省质量竞争力指数总体呈上升趋势，但与全国平均水平相比，江西省制造业质量竞争力仍然存在较大的差距。二是工业化程度较高的地区质量竞争力较强。三是重工业质量竞争力明显优于轻工业，且在行业分布上的非均衡性较为突出。四是与全国同行业相比，具有质量竞争力优势的行业较少。五是六大支柱产业达到或接近全国同行业平均水平，但缺